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Evaluating Consistency of Nondestructive Evaluation of Flexible Pavement by GPR and PSPA

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Consistency is one of the major issues during the Nondestructive Test & Evaluation (NDT & E) of flexible pavement, i.e., asphalt pavement, by Ground Penetrating Radar (GPR) and Portable Seismic Property Analyzer (PSPA). In some recent nondestructive tests on instrumented pavement section at Milepost (MP) 141 on Interstate-40 (I-40), New Mexico, it is observed that 2-way travel time of GPR signal in unbound layers transmitted by Ground-Coupled Antenna (GCA) varies in different months which leads to different values of layer thickness at a same section and it is believed that the reason is moisture variation. In case of PSPA, tests on Asphalt Concrete (AC) surface show higher level of inconsistency at repeated drops on the same test locations which is believed due to irregular contact between the sensors and surface. To date, unbound materials were collected from the pavement section to measure dielectric constant by Percoemeter in laboratory at varying moisture content. Later, the dielectric constants at varying moisture content are incorporated during the post-processing of GPR data, and thus, the level of consistency is improved. In case of PSPA, quick-setting capping, i.e., a mixture of Plaster of Paris and fine content, is made on AC surface at different locations prior to the tests to ensure firm and smooth contact surfaces. It is observed that consistency of PSPA measurements and interpreted results is improved significantly. Based on the observations, it is recommended to incorporate dielectric constants at varying moisture content to the GPR post-processing. In addition, incorporate capping before a PSPA test on an AC surface.